

GP-303337

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1. (Currently Amended) A screw-type magnetorheological damper, comprising:

a thrust shaft comprising an external threaded surface in threaded communication with a sealed housing, wherein at least one end of the thrust shaft extends from the housing;

at least one rotor disposed in the housing comprising a planar surface with a centrally located aperture, wherein the at least one rotor is in direct contact and rotatably engaged with the threaded surface of the thrust shaft;

at least one stator spaced apart from and adjacent to the at least one rotor, wherein the at least one stator is fixedly attached to the housing and comprises a centrally located aperture dimensioned to accommodate vertical movement of the thrust shaft and a planar surface substantially parallel to the planar surface of the at least one rotor;

at least one alignment bearing disposed on a free end of the planar surface of the at least one rotor to maintain a clearance between the at least one rotor and the at least one stator and to carry a thrust load;

a magnetorheological fluid disposed in a space defined by the at least one rotor and the at least one stator; and

means for applying a substantially perpendicular magnetic field to the magnetorheological fluid relative to the planar surface of the at least one stator.
2. (Canceled)
3. (Original) The screw type magnetorheological damper of Claim 1, wherein the means for applying a substantially perpendicular magnetic field comprises a coil of wire about the at least one stator and a power source in electrical communication within the coil.

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4. (Original) The screw type magnetorheological damper of Claim 1, wherein the means for applying a substantially perpendicular magnetic field comprises a permanent magnet formed in the stator.
5. (Original) The screw type magnetorheological damper of Claim 1, wherein the at least one rotor and the at least one stator are alternately arranged in the housing.
6. (Original) The screw type magnetorheological damper of Claim 1, wherein the magnetorheological fluid comprises carbonyl iron and an inorganic material selected from the group consisting of zinc oxide, silicon dioxide, molybdenum sulfide, and boron nitride.
7. (Original) The screw type magnetorheological damper of Claim 1, wherein the magnetorheological fluid comprises ferromagnetic or paramagnetic particles or particulates dispersed in a carrier fluid.
8. (Original) The screw type magnetorheological damper of Claim 1, wherein the means for applying a magnetic field comprises a permanent magnet or an electromagnet.
9. (Original) The screw type magnetorheological damper of Claim 4, wherein the particles are in an amount of about 5 to about 75 percent by volume of the magnetorheological fluid.
10. (Original) The screw type magnetorheological damper of Claim 1, wherein the at least one stator spaced apart from and adjacent to the at least one rotor is at a distance of about 0.1 to about 2 millimeters.
11. (Original) The screw type magnetorheological damper of Claim 1, wherein the at least one stator spaced apart from and adjacent to the at least one rotor is at a distance less than about 2 millimeters.

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12. (Currently Amended) A screw-type magnetorheological damper, comprising:

a thrust shaft comprising an external threaded surface in threaded communication with a sealed housing, wherein at least one end of the thrust shaft extends from the housing;

a plurality of rotors and stators alternatingly arranged in the housing, wherein each of the plurality of rotors comprise a planar surface with a centrally located aperture, wherein each of the plurality of rotors is in direct contact with and rotatably engaged with the threaded surface of the thrust shaft, wherein each of the plurality of stators is fixedly attached to the housing and comprises a centrally located aperture dimensioned to accommodate vertical movement of the thrust shaft and a planar surface substantially parallel to the planar surface of the plurality of rotors, and wherein alternating stators comprise a permanent magnet or an electromagnet; [[and]]

at least one alignment bearing disposed on a free end of the planar surface of each of the plurality of rotors to maintain clearances between each of the plurality of rotors and each of the plurality of stators and to carry thrust loads; and

a magnetorheological fluid disposed in a space defined by the plurality of rotors and stators.

13. (Original) The screw-type magnetorheological damper of Claim 12, wherein the pluralities of rotors and stators comprises (n) stators and (n+1) rotors, wherein n is an integer.

14. (Canceled)

15. (Original) The screw type magnetorheological damper of Claim 12, wherein the magnetorheological fluid comprises carbonyl iron and an inorganic material selected from the group consisting of zinc oxide, silicon dioxide, molybdenum sulfide, and boron nitride.

16. (Original) The screw type magnetorheological damper of Claim 12, wherein the magnetorheological fluid comprises ferromagnetic or paramagnetic particles or particulates dispersed in a carrier fluid.

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17. (Original) The screw type magnetorheological damper of Claim 12, wherein the means for applying a magnetic field comprises a permanent magnet or an electromagnet.

18. (Original) The screw type magnetorheological damper of Claim 12, wherein the particles are in an amount of about 5 to about 75 percent by volume of the magnetorheological fluid.

19. (Original) The screw type magnetorheological damper of Claim 12, wherein the plurality of rotors and stators alternately arranged in the housing are spaced apart at a distance of about 0.1 to about 2 millimeters.

20. (Original) The screw type magnetorheological damper of Claim 12, wherein the plurality of rotors and stators alternately arranged in the housing are spaced apart at a distance less than about 2 millimeters.

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21. (Currently Amended) A process for operating a screw-type magnetorheological damper for variably converting a linear force to a rotary force, comprising:

axially applying a force to a thrust shaft of a screw-type magnetorheological damper, wherein the screw-type magnetorheological damper comprises the thrust shaft having an external threaded surface in threaded communication with a sealed housing, at least one rotor disposed in the sealed housing comprising a planar surface with a centrally located aperture, wherein the at least one rotor is in direct contact and rotatably engaged with the threaded surface of the thrust shaft, at least one stator spaced apart from and adjacent to the at least one rotor, wherein the at least one stator is fixedly attached to the housing and comprises a centrally located aperture dimensioned to accommodate vertical movement of the thrust shaft and a planar surface substantially parallel to the planar surface of the at least one rotor, and wherein at least one alignment bearing is disposed on the free end of the at least one rotor to maintain a clearance between the at least one rotor and the at least one stator and to carry a thrust load, and a magnetorheological fluid disposed in a space defined by the at least one rotor and the at least one stator; and

variably applying a substantially perpendicular magnetic field to the magnetorheological fluid relative to the planar surface of the at least one stator so as to variably convert the linear force applied to the thrust shaft into the rotary force.

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22. (Withdrawn) A magnetorheological damper, the damper comprising:
- a cylindrically shaped housing;
 - a magnetorheological fluid disposed in the cylindrically shaped housing;
 - a piston assembly disposed within the cylindrically shaped housing in sliding engagement with the cylindrically shaped housing defining a first chamber and a second chamber, wherein the piston assembly comprises an annular starburst flow channel extending from the first chamber to the second chamber, and an electromagnet centrally disposed in the piston assembly, wherein a cross sectional area provided by the annular starburst flow channel is at least about 30 percent of available cross sectional area of the piston assembly; and
 - a power supply in electrical communication with the electromagnet.
23. (Canceled)

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